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(54) Motor vehicle door lock

(57) A motor vehicle door lock in a central locking mechanism has 'locked', 'unlocked', and 'anti-theft protection' operating positions and an emergency unlocking facility. A driven screw 6 carries a nut 7 which acts on a lever 2. An operating linkage for a rotary latch and pawl is acted on by the lever 2 which is formed as two relatively pivoted partial levers 21, 22 normally urged by a spring system 9 to the rigid configuration shown in fig. 1 with stop elements 8 interengaging. In operation between the 'unlocked' (fig. 1) and 'locked' (fig. 2, not shown) positions the partial levers 21, 22 pivot while maintaining this configuration, but when the nut 7 is moved to the right beyond the 'locked position' to the 'anti-theft' position shown in fig. 3, lever 21 can be moved with respect to lever 22. In addition an emergency unlocking movement of the linkage is possible as lever 22 can be moved clockwise from the fig. 2 position with respect to lever 21 (fig. 4, not shown).

Fig.1

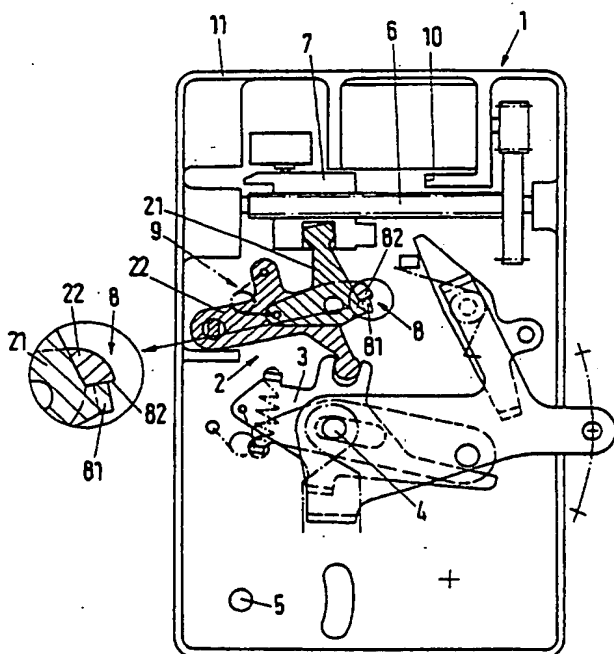
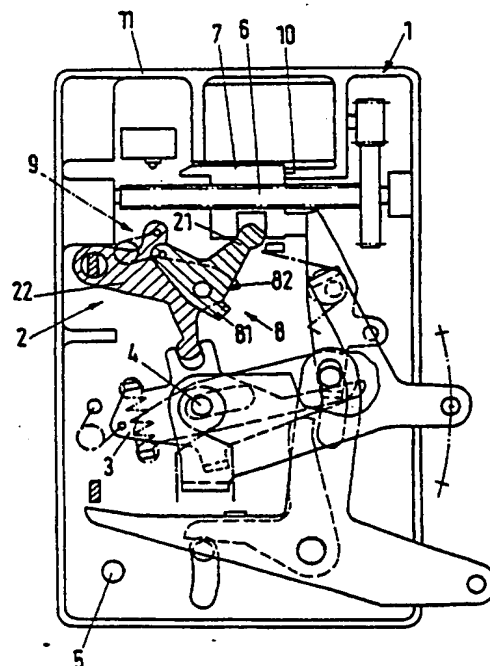


Fig.3



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Fig.1

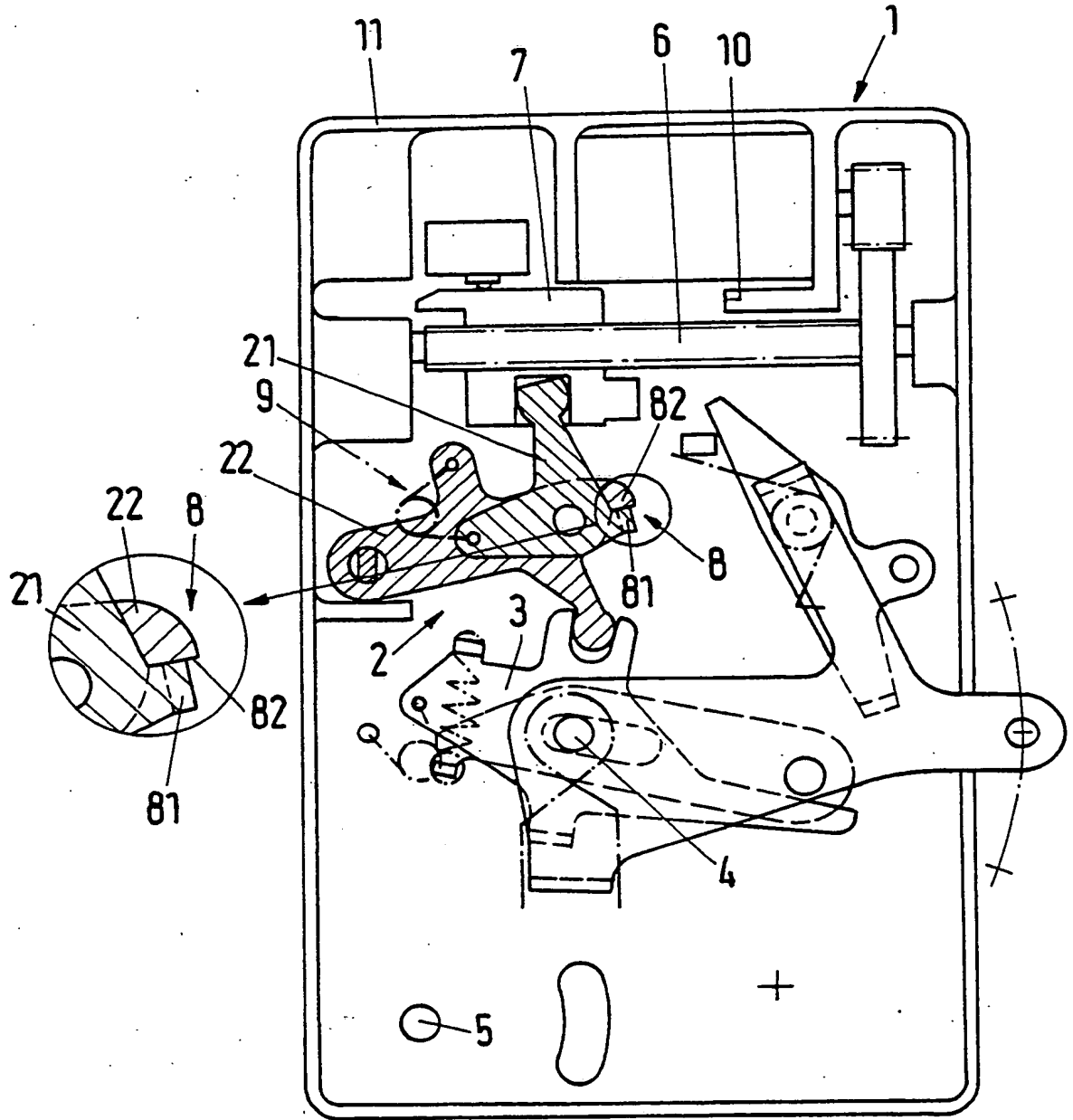


Fig.3

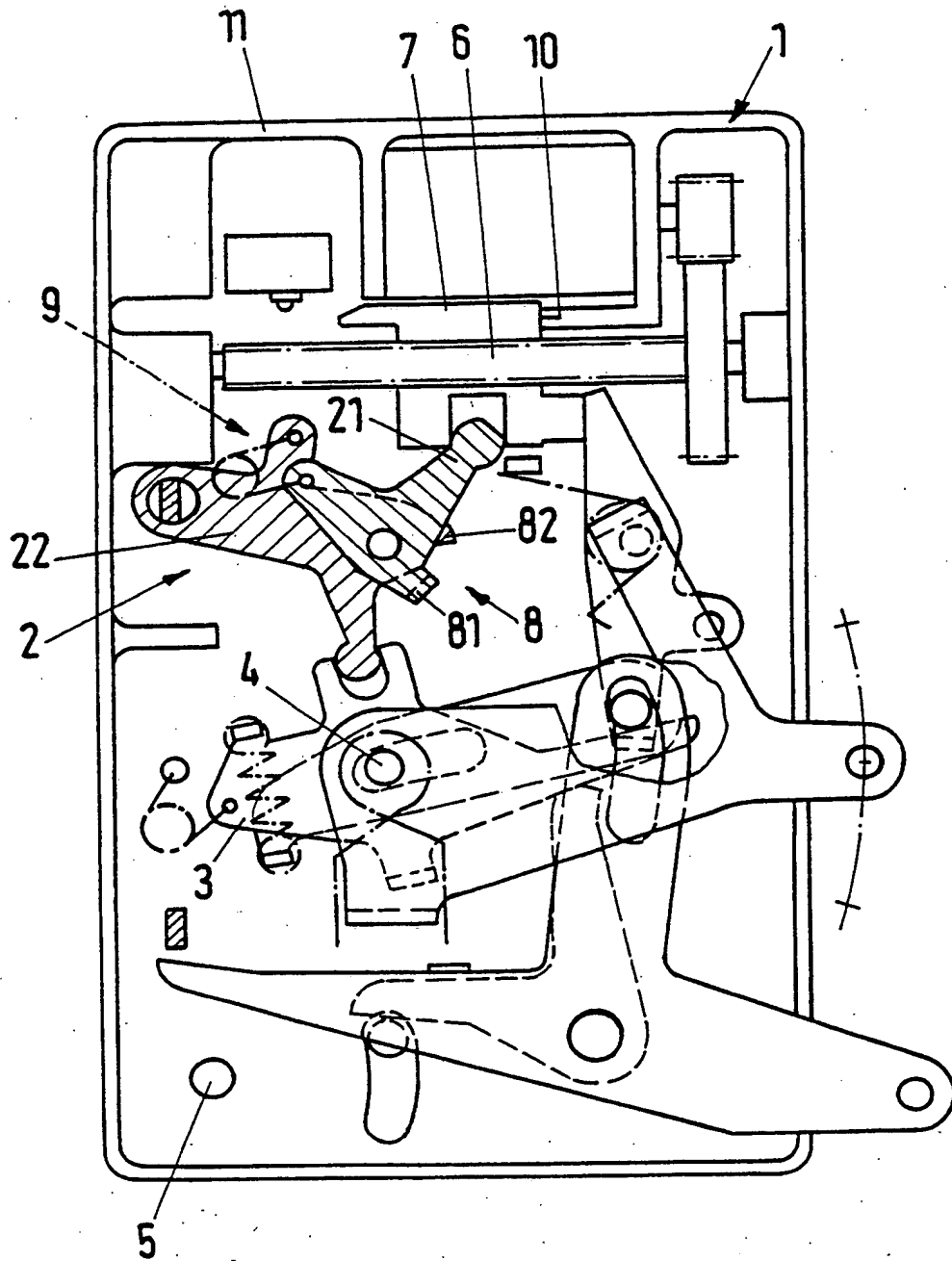


Fig.2

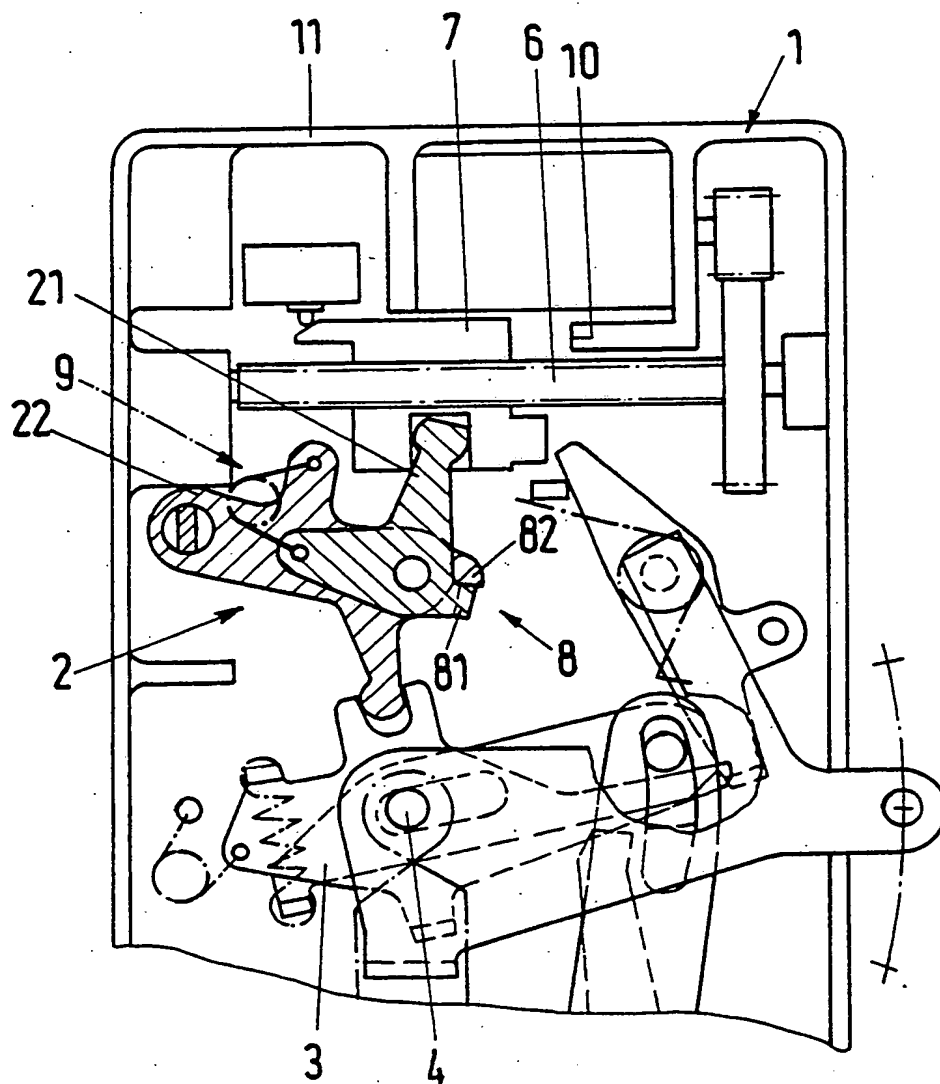
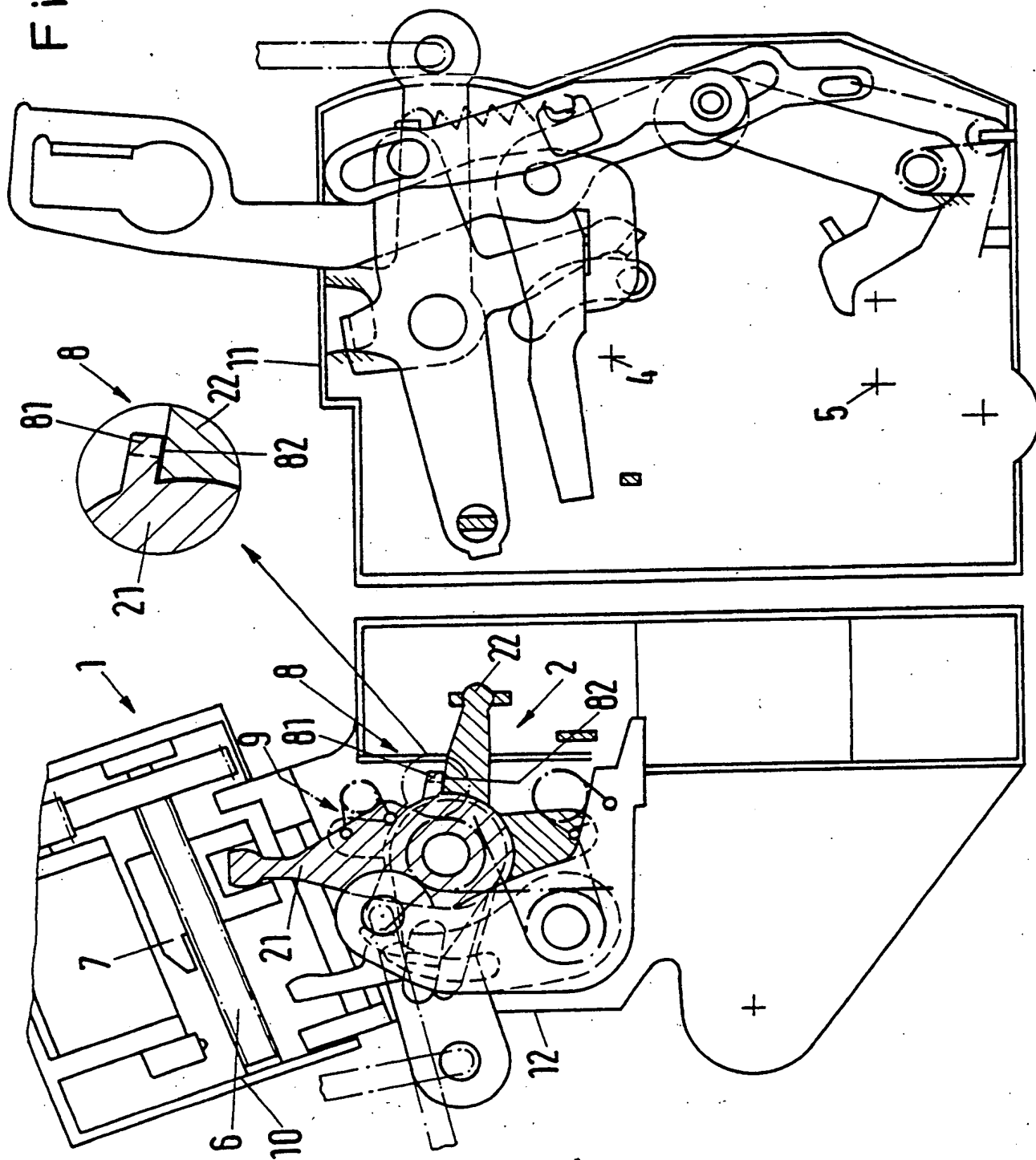


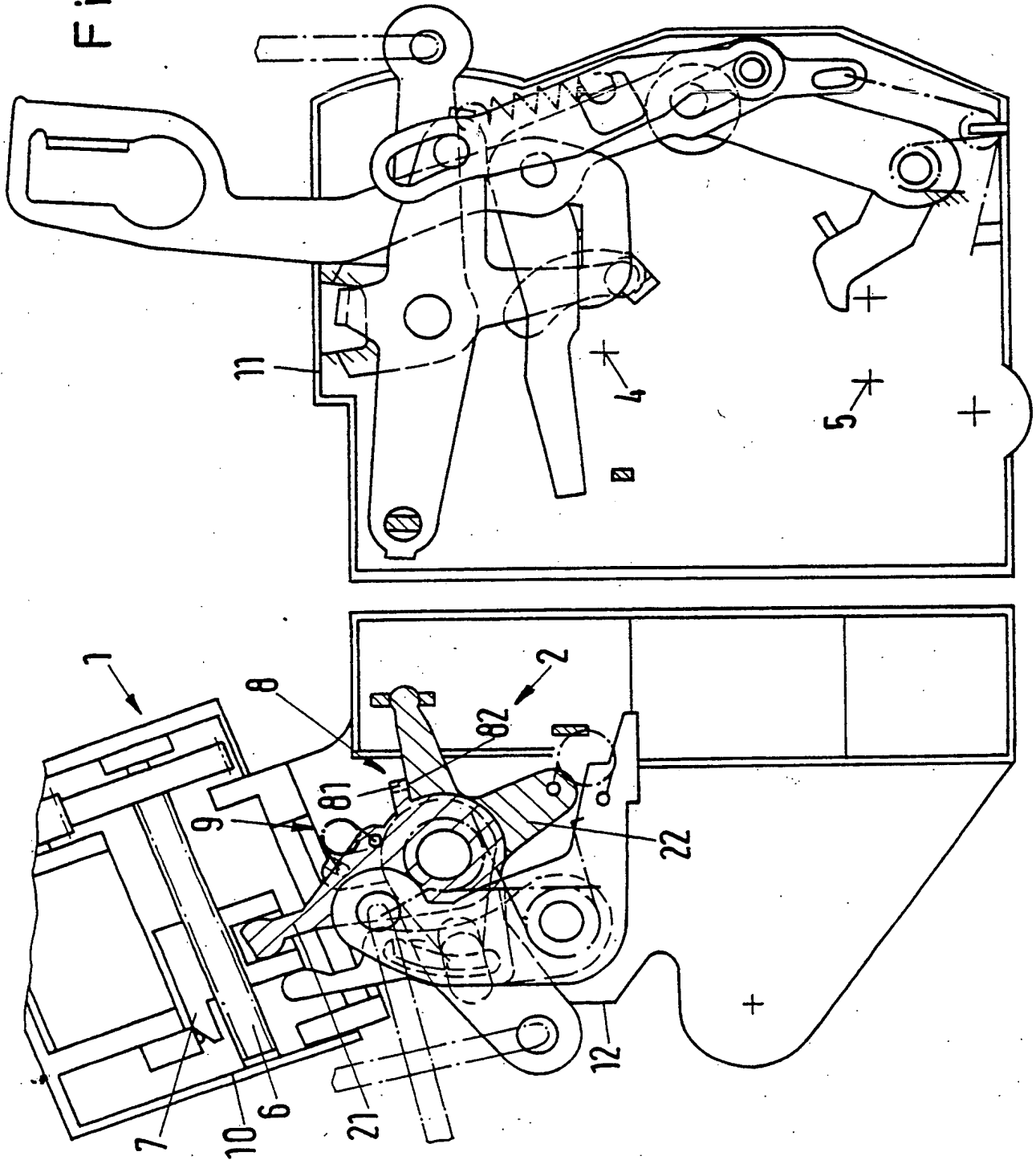
Fig.5



2



Fig.6



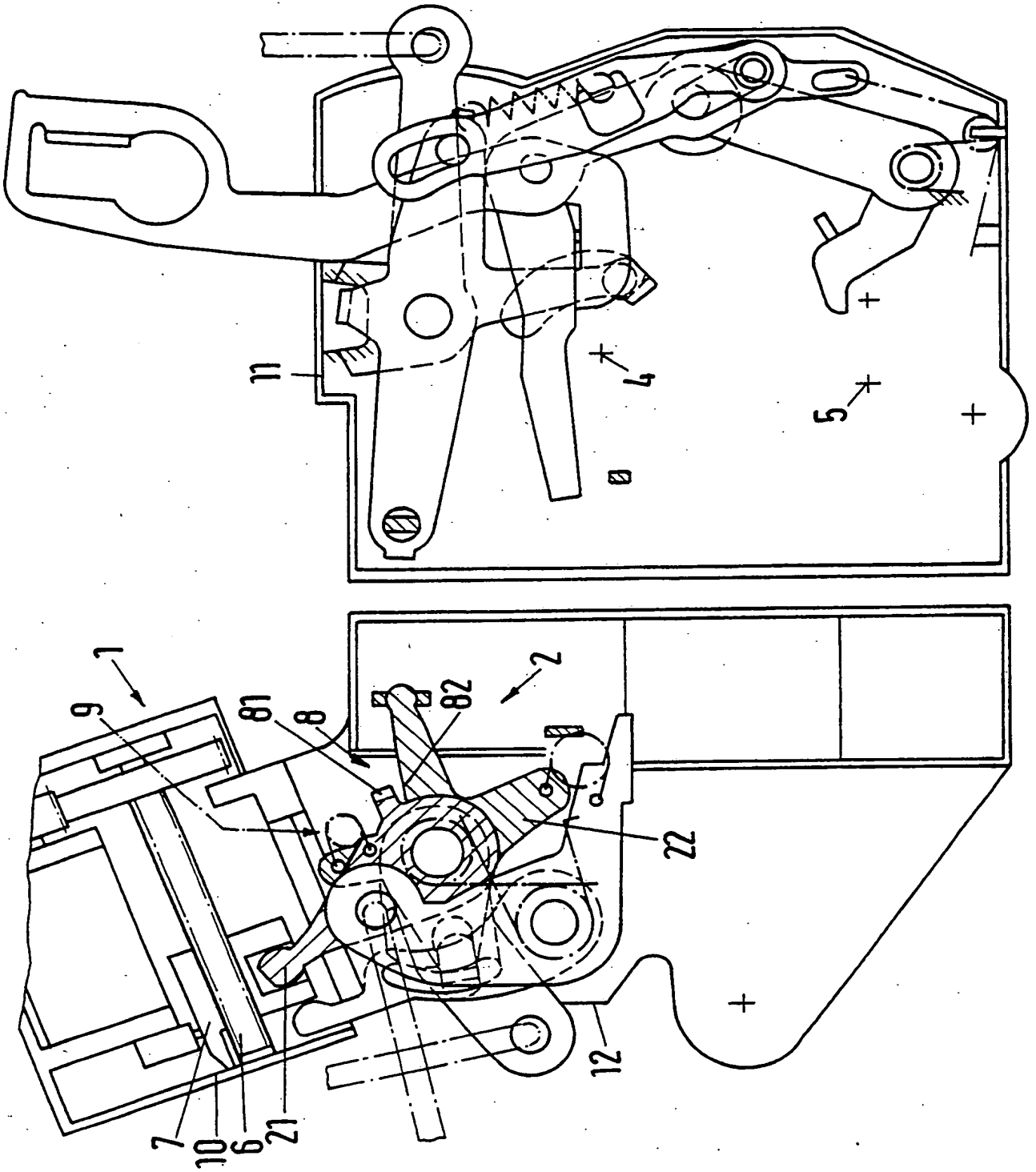


Fig.7

MOTOR VEHICLE DOOR LOCK

This invention relates to a motor vehicle door lock with a central locking operating mechanism for the "locked", "unlocked" and "anti-theft protection" operating positions, and with an emergency unlocking facility, - with a rotary
5 latch and pawl and with an additional locking chain which comprises an internal locking lever on which the central locking operating mechanism operates. The term "emergency unlocking" means that if the power supply to the central locking operating mechanism fails, it must also be possible to
10 effect unlocking manually via the closing cylinder using the associated key, from the "anti-theft protection" and "locked" operating positions. The expression "motor vehicle door" also comprises tailgates and compartment covers.

In the known motor vehicle door locks from which the
15 present invention stems (DE 39 02 776 C2, DE 39 02 873 C2), a spindle nut and a bolt are disposed on the spindle. The spindle nut moves the bolt from the "unlocked" operating position into the "locked" and "anti-theft protection" operating positions and vice versa. The internal locking
20 lever is attached to the bolt for this purpose. For emergency unlocking, the internal locking lever can be moved manually into the "unlocked" operating position via the closing cylinder and the associated key, and the bolt moves with it in free-wheel, whilst the spindle nut maintains its position in
25 the "locked" or "anti-theft protection" position. A latch coupling is provided for this purpose between the bolt and the spindle nut. Reference is also made to DE 34 43 287 C2 in

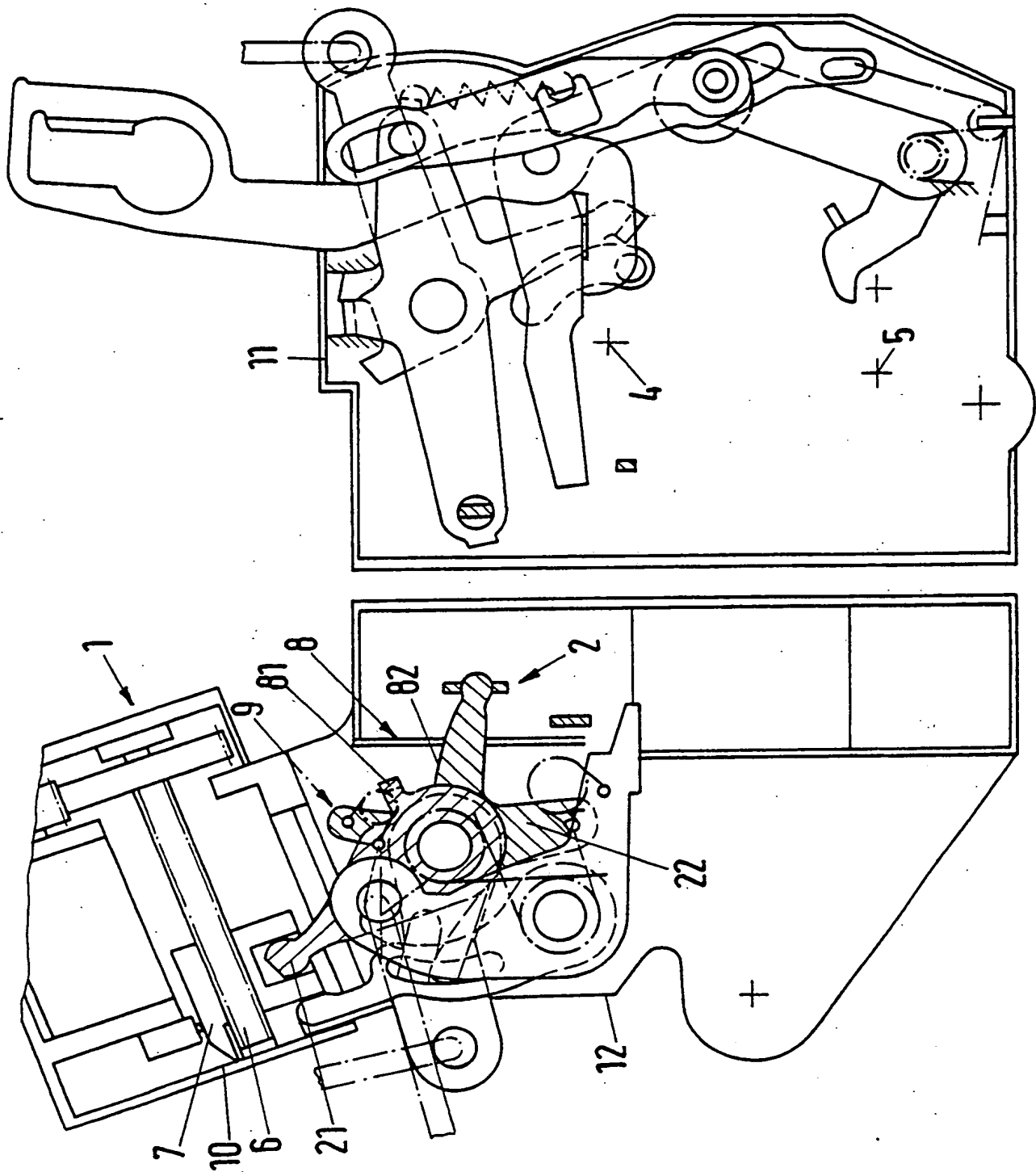


Fig.8

b) in the "anti-theft protection" operating position the rigidity of the two partial levers is removed and they are swivelled in relation to each other, and the spring system is extended,

5 c) when the internal locking lever with its partial levers moves back from the "anti-theft protection" operating position into the "locked" operating position, the spring system makes the partial levers rigid again, that the first partial lever of the internal locking lever is
10 attached to the spindle nut and is merely operated by the latter in accordance with the "unlocked", "locked" and "anti-theft protection" operating positions and the second partial lever operates the locking chain, and that on the emergency unlocking of the motor vehicle door lock from the "locked" or
15 "anti-theft protection" operating position the second partial lever of the internal locking lever can be moved via the closing cylinder of the motor vehicle door lock by means of keys into the position corresponding to the "unlocked" operating position, wherein the second partial lever swivels
20 in relation to the first partial lever with extension of the spring system, which is bistable in this respect, and the first partial lever is attached to the spindle nut which remains in the "locked" or "anti-theft protection" operating position. Compared with the form of construction described
25 initially, the spindle nut and the bolt are combined to form the spindle nut which operates according to the invention, and this acts together with the internal locking lever, which is broken down into two partial levers.

relation to the kinematics of the interrelationships. The known measures have been proven in practice, but necessitate a motor in the central locking operating mechanism, which has to apply relatively high forces, particularly since the latch
5 coupling has to be overcome on opening and closure.

A basic object of the present invention is to simplify a motor vehicle door lock of the construction described initially so that the motor of the central locking operating mechanism has to apply forces which are significantly lower,
10 and consequently can be of lighter and simpler construction.

According to the present invention, there is provided a motor vehicle door lock with a central locking operating mechanism for the "locked", "unlocked" and "anti-theft protection" operating positions, and with an emergency
15 unlocking facility - with a rotary latch and pawl and with an additional locking chain which comprises an internal locking lever on which the central locking operating mechanism operates, wherein the internal locking lever is broken down into two partial levers, which can swivel via a swivel pin in
20 relation to each other with a degree of swivelling freedom restricted by stop elements, and which are acted upon by a spring system acting between the partial levers, wherein

a) in the "unlocked" operating position and in the "locked" operating position of the motor vehicle door lock,
25 the partial levers are made rigid against each other under the effect of the stop elements and the spring system, which in this respect is monostable, and operate like a rigid internal locking lever,

According to a preferred embodiment of the invention, the stop elements are constructed as an angled portion on the first partial lever and as a projection, associated with the angled portion, on the second partial lever of the internal locking lever. Within the scope of the invention a spindle may be employed, the screw thread of which has a relatively fine pitch; this further reduces the power requirement from the motor of the central locking operating mechanism. At the same time, a relatively short stroke may be provided for the spindle nut. For this purpose, the invention teaches that in the "anti-theft protection" operating position the spindle nut is seated against a stop on the central locking operating mechanism, which stop points towards the spindle nut and shortens the stroke travel of the spindle nut.

The measures described may be put into effect in motor vehicle door locks which are otherwise constructed in the known manner, even if they differ in detail. In this connection the invention teaches that the central locking operating mechanism with the spindle and spindle nut and with the internal locking lever with its partial levers is installed in the lock housing of the motor vehicle door lock, preferably in the lock housing of a single component lock. However, it is also possible to construct the central locking operating mechanism with the spindle and spindle nut and the internal locking lever with its partial levers as a separate component, to accommodate this in an appropriate housing and to mount it on the lock housing of the motor vehicle door lock, preferably on a lock housing of lock which is of two-

component construction in this respect.

The invention is described in detail below with reference to the drawings, which are merely schematic illustrations of examples of embodiments, in which drawings:

5 Figure 1 is a view of a first embodiment of motor vehicle door lock according to the invention, with the housing components removed, in the "unlocked" operating position;

 Figure 2 illustrates a portion of Figure 1 in the "locked" operating position;

10 Figure 3 illustrates the lock of Figure 1 in the "anti-theft protection" operating position;

 Figure 4 illustrates the lock of Figure 1 in the "emergency unlocked" operating position;

15 Figure 5 illustrates another embodiment of the invention, on the same scale as Figure 1; the Figure on the left shows the "unlocked" operating position, whilst the Figure on the right is rotated into the plane of the drawing by 90° compared with the left-hand Figure, with the first lock component exposed;

20 Figure 6 illustrates the lock of Figure 5 in the "locked" operating position;

 Figure 7 illustrates the lock of Figure 5 in the "anti-theft protection" operating position; and

25 Figure 8 illustrates the lock of Figure 5 in the "emergency unlocked" operating position.

Motor vehicle door locks with a central locking operating mechanism 1 for the "locked", "unlocked" and "anti-theft protection" operating positions, and which also comprise

an emergency unlocking facility, are illustrated firstly in Figures 1 to 4 and secondly in Figures 5 to 8. Their basic construction, not all of which is illustrated, comprises a rotary latch and pawl and an additional locking chain which
5 comprises an internal locking lever 2. In the embodiments illustrated, but without the invention being restricted thereto, an internal locking continuation lever 3 is attached to the internal locking lever 2. Only the axis 4 of the rotary latch is indicated, and only the axis 5 of the pawl is
10 indicated. In addition, the central locking operating mechanism has a spindle 6 and a spindle nut 7.

As indicated by the separate cross-hatching in Figures 1 and 5, the internal locking lever 2 is broken down into two partial levers 21, 22, which can swivel via a swivel pin in
15 relation to each other with a degree of swivelling freedom restricted by stop elements 8, and which are acted upon by a spring system 9 acting between the partial levers 21, 22.

The arrangement is effected so that in the "unlocked" operating position and in the "locked" operating position of
20 the motor vehicle door lock, the partial levers 21, 22 are made rigid against each other under the effect of the stop elements 8 and the spring system 9, which in this respect is monostable, and operate like a rigid internal locking lever 2. In the "anti-theft protection" operating position the rigidity
25 of the two partial levers 21, 22 is removed and they are swivelled in relation to each other. The spring system 9 is extended in this position. This is understood to mean that the spring system 9 has a spring tension in this position. It

may also of course be pre-stressed in the position described previously. When the internal locking lever 2 with its partial levers 21, 22 moves back from the "anti-theft protection" operating position into the "locked" operating position, the spring system 9 makes the partial levers 21, 22 rigid again. In the embodiment illustrated, the stop elements 8 are constructed as an angled portion 81 on the partial lever 21 and as a projection 82, which is associated with the angled portion 81, on the partial lever 22.

10 It may be seen from the embodiments shown in Figures 1 and 5 that the first partial lever 21 of the internal locking lever 2 is attached to the spindle nut and is merely operated by the latter in accordance with the "unlocked", "locked" and "anti-theft protection" operating positions, whilst the second
15 partial lever 22 operates the attached locking chain with its remaining components, which are not provided with reference numerals. Moreover, the arrangement is effected so that on the emergency unlocking of the motor vehicle door lock from the "locked" operating position or from the "anti-theft
20 protection" operating position the second partial lever 22 of the internal locking lever 2 can be moved via the closing cylinder of the motor vehicle door lock by means of keys into the position corresponding to the "unlocked" operating position. It may be seen from Figure 4 that at the same time
25 the second partial lever 22 swivels in relation to the first partial lever 21 with an extension of the spring system 9, which is bistable in this respect. The first partial lever 21 remains attached to the spindle nut 7, which remains in the

"locked" or "anti-theft protection" operating position.

In the embodiment illustrated, and according to a preferred embodiment of the invention, the stop elements 8 are constructed, as mentioned above, as an angled portion 81 on the first partial lever 21 and as a projection 82, associated with the angled portion 81, on the second partial lever 22 of the internal locking lever 2. Reference is made to the enlarged portions of Figures 1 and 5 in this respect. It may be seen from Figure 3 that in the "anti-theft protection" operating position the spindle nut 7 is seated against a stop 10 of the central locking operating mechanism 1, which stop points towards the spindle nut 7 and shortens the stroke travel of the spindle nut 7.

Figures 1 to 4 illustrate an embodiment in which the central locking operating mechanism 1 with the spindle 6 and spindle nut 7, and with the internal locking lever 1 with its partial levers 21, 22, is accommodated in the lock housing 11 of the motor vehicle door lock, which is a single-component lock here. In the embodiment illustrated in Figures 5 to 8 the central locking operating mechanism 1 with the spindle and spindle nut 7, and with the internal locking lever 2 with its partial levers 21, 22, forms an independent component with a separate housing 12. This component is mounted on the lock housing 12 of the motor vehicle door lock. The lock housing here is the lock housing of a two-component lock.

The components in Figures 1 to 4 which are not provided with reference numerals, of which the usual locking chain is one, are not a subject of the invention and are

described in DE 39 02 776 C2, in relation to their operation also. The same applies to the components in Figures 5 to 8 which are not provided with reference numerals, and which are described in DE 39 02 873 C2.

CLAIMS

1. A motor vehicle door lock with a central locking operating mechanism for the "locked", "unlocked" and "anti-theft protection" operating positions, and with an emergency unlocking facility - with a rotary latch and pawl and with an additional locking chain which comprises an internal locking lever on which the central locking operating mechanism operates, wherein the internal locking lever is broken down into two partial levers, which can swivel via a swivel pin in relation to each other with a degree of swivelling freedom restricted by stop elements, and which are acted upon by a spring system acting between the partial levers, wherein

a) in the "unlocked" operating position and in the "locked" operating position of the motor vehicle door lock, the partial levers are made rigid against each other under the effect of the stop elements and the spring system, which in this respect is monostable, and operate like a rigid internal locking lever,

b) in the "anti-theft protection" operating position the rigidity of the two partial levers is removed and they are swivelled in relation to each other, and the spring system is extended,

c) when the internal locking lever with its partial levers moves back from the "anti-theft protection" operating position into the "locked" operating position, the spring system makes the partial levers rigid again, that the first partial lever of the internal locking lever is attached to the spindle nut and is merely operated by the

latter in accordance with the "unlocked", "locked" and "anti-theft protection" operating positions and the second partial lever operates the locking chain, and that on the emergency unlocking of the motor vehicle door lock from the "locked" or "anti-theft protection" operating position the second partial lever of the internal locking lever can be moved via the closing cylinder of the motor vehicle door lock by means of keys into the position corresponding to the "unlocked" operating position, wherein the second partial lever swivels in relation to the first partial lever with an extension of the spring system, which is bistable in this respect, and the first partial lever is attached to the spindle nut which remains in the "locked" or "anti-theft protection" operating position.

2. A motor vehicle door lock according to claim 1, wherein the stop elements are constructed as an angled portion on the first partial lever and as a projection, associated with the angled portion, on the second partial lever of the internal locking lever.

3. A motor vehicle door lock according to one of claims 1 or 2, wherein in the "anti-theft protection" operating position the spindle nut is seated against a stop of the central locking operating mechanism, which stop points towards the spindle nut and shortens the stroke travel of the spindle nut.

4. A motor vehicle door lock according to any one of claims 1 to 3, wherein the central locking operating mechanism with the spindle and spindle nut and with the internal locking

lever with its partial levers is disposed in the lock housing of the motor vehicle door lock, preferably in the lock housing of a single-component lock.

5 5. A motor vehicle door lock according to any one of claims 1 to 3, wherein the central locking operating mechanism with the spindle and spindle nut and with the internal locking lever with its partial levers is constructed as an independent component and is mounted on the lock housing of the motor vehicle door lock, preferably on a lock housing
10 of a two-component lock.

6. A motor vehicle door lock substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.

7. A motor vehicle door lock substantially as
15 hereinbefore described with reference to Figures 5 to 8 of the accompanying drawings.

- 13 -

Relevant Technical Fields

- (i) UK Cl (Ed.M) E2A (AMXF)
(ii) Int Cl (Ed.5) E05B (47/00; 65/36)

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES : WPI

Search Examiner
P J SILVIE

Date of completion of Search
12 APRIL 1994

Documents considered relevant
following a search in respect of
Claims :-
1-5

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|---|---|
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| Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. | E: Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| A: Document indicating technological background and/or state of the art. | &: Member of the same patent family; corresponding document. |

Category	Identity of document and relevant passages	Relevant to claim(s)
A	GB 1572102 A (KIEKERT)	1